What is claimed is:

1. A solid immersion mirror device made principally of a light-permeable medium having a refractive index of greater than 1, said solid immersion mirror device comprising:

a first reflecting surface which is part of a curved surface produced by rotating a parabola about a symmetry axis thereof; and

a second reflecting surface which is part of a plane perpendicular to a line segment connecting the focus of said parabola and the vertex of said parabola,

wherein collimated light entering said medium from the second reflecting surface side along said symmetry axis is reflected sequentially from said first and second reflecting surfaces while propagating in said medium, and is then focused to a light focusing point on a boundary of said medium.

2. The solid immersion mirror device according to claim 1,

wherein a surface of said medium on which said light is incident is a flat surface perpendicular to an incident direction of said light.

3. The solid immersion mirror device according to claim 1,

wherein a surface of said medium is provided with a mask near said light focusing point, and said mask has a minute opening formed at said light focusing point.

4. The solid immersion mirror device according to claim 3,

wherein said minute opening has a diameter not greater than a wavelength of said light.

5. A solid immersion mirror device made principally of a light-permeable medium having a refractive index of greater than 1, said solid immersion mirror device comprising:

a first reflecting surface which is part of a curved surface produced by rotating part of a parabola lying on the opposite side of a rotational axis from the vertex of said parabola about said rotational axis, said rotational axis being parallel to the symmetry axis of said parabola and intersecting said parabola at a position spaced apart from said vertex of said parabola; and

a second reflecting surface which is part of a conical surface produced by rotating part of a line lying on the opposite side of said rotational axis from said vertex, said line being perpendicular to a line segment connecting the focus of said parabola and a point of intersection of said parabola and said rotational axis within a plane including said parabola,

wherein collimated light entering said medium from the second reflecting surface side along said rotational axis is reflected sequentially from said first and second reflecting surfaces while propagating in said medium, and is then focused to a light focusing point on a boundary of said medium.

6. The solid immersion mirror device according to claim 5,

wherein said rotational axis and said second reflecting surface intersect each other, and part of light reflected from said first reflecting surface is reflected from near a point of intersection of said rotational axis and said second reflecting surface.

7. The solid immersion mirror device according to claim 5,

wherein a surface of said medium on which said light is incident is a flat surface perpendicular to an incident direction of said light.

8. The solid immersion mirror device according to claim 5,

wherein a surface of said medium is provided with a mask near said light focusing point, and said mask has a minute opening formed at said light focusing point.

9. The solid immersion mirror device according to claim 8,

wherein said minute opening has a diameter not greater than a wavelength of said light.

10. A solid immersion mirror device made principally of a light-permeable medium having a refractive index of greater than 1, said solid immersion mirror device comprising:

a first reflecting surface of a substantially annular shape and provided in a lower portion of said medium; and

a second reflecting surface provided in an upper portion of said medium,

wherein light entering said medium in a predetermined direction from said upper portion to said lower portion is reflected sequentially from said first and second reflecting surfaces while propagating in said medium, and is then focused to a light focusing point on a boundary of said medium, and

wherein part of light reflected from said first reflecting surface is reflected from near a point of intersection of said second reflecting surface and a line passing through said light focusing point and parallel to said predetermined direction.

11. The solid immersion mirror device according to claim 10,

wherein said light entering said medium is collimated light;

wherein said first reflecting surface is part of a curved surface produced by rotating a parabola having a symmetry axis extending in said predetermined direction about said symmetry axis; and

wherein said second reflecting surface is part of a plane which is a perpendicular bisector of a line segment connecting the focus of said parabola and the vertex of said parabola.

12. The solid immersion mirror device according to claim 10,

wherein said first reflecting surface is part of a conical surface having a rotational axis parallel to said predetermined direction and a vertex pointing toward said lower portion; and

wherein said second reflecting surface is part of a surface produced by rotating a parabola about a line passing through said focus of said parabola.

13. The solid immersion mirror device according to claim 10,

wherein each of said first and second reflecting surfaces is part of a curved surface produced by rotating a curved line about an axis extending in said predetermined direction.

14. The solid immersion mirror device according to claim 10,

wherein a surface of said medium is provided with a mask near said light focusing point, and said mask has a minute opening formed at said light focusing point.

15. The solid immersion mirror device according to claim 14,

wherein said minute opening has a diameter not greater than a wavelength of said light.

16. A solid immersion mirror device made principally of a light-permeable medium having a refractive index of greater than 1, said solid immersion mirror device comprising:

a first reflecting surface provided in a lower portion of said medium; and

a second reflecting surface provided in an upper portion of said medium,

wherein at least part of light entering said medium in a predetermined direction from said upper portion to said lower portion passes through said second reflecting surface, is thereafter reflected sequentially from said first and second reflecting surfaces while propagating in said medium, and is then focused to a light focusing point on a boundary of said medium.

17. The solid immersion mirror device according to claim 16,

wherein said light entering said medium is collimated light; and

wherein said second reflecting surface is an upper surface of said medium and is a flat surface perpendicular to said predetermined direction.

18. The solid immersion mirror device according to claim 17,

wherein said first reflecting surface is part of a curved surface produced by rotating a parabola having a symmetry axis extending in said predetermined direction about said symmetry axis.

19. The solid immersion mirror device according to claim 17,

wherein said second reflecting surface is provided with a coating for selectively transmitting light with a small incident angle.

20. The solid immersion mirror device according to claim 16,

wherein said second reflecting surface is positioned inside said medium.

21. The solid immersion mirror device according to claim 20,

wherein said first reflecting surface is a flat surface perpendicular to said predetermined direction; and

wherein said second reflecting surface is part of a curved surface produced by rotating a parabola having a symmetry axis extending in said predetermined direction about said symmetry axis.

22. The solid immersion mirror device according to claim 16, further comprising

a component between said first and second reflecting surfaces for changing a state of polarization of light passing therethrough,

wherein said second reflecting surface transmits light polarized in a predetermined polarization direction and reflects light polarized in a direction perpendicular to said predetermined polarization direction; and

wherein said component for changing said state of polarization converts light incident from said first reflecting surface on said second reflecting surface into light polarized in a direction perpendicular to said predetermined polarization direction.

23. The solid immersion mirror device according to claim 16,

wherein a surface of said medium is provided with a mask near said light focusing point, and said mask has a minute opening formed at said light focusing point.

24. The solid immersion mirror device according to claim 23,

wherein said minute opening has a diameter not greater than a wavelength of said light.

25. A reproducing apparatus for reading information recorded on a recording medium, said reproducing apparatus comprising:

a light source;

a solid immersion mirror device made principally of a light-permeable medium having a refractive index of greater than 1,

said solid immersion mirror device including

a first reflecting surface which is part of a curved surface produced by rotating a parabola about a symmetry axis thereof, and

a second reflecting surface which is part of a plane perpendicular to a line segment connecting the focus of said parabola and the vertex of said parabola,

wherein collimated light entering said medium from the second reflecting surface side along said symmetry axis is reflected sequentially from said first and second reflecting surfaces while propagating in said medium, and is then focused to a light focusing point on a boundary of said medium;

an optical system for directing light emitted from said light source to said solid immersion mirror device;

a scanning mechanism for scanning said solid immersion mirror device along a

recording surface of said recording medium, with said light focusing point of said solid immersion mirror device opposed to said recording surface; and

a detector for detecting light from said recording surface.

26. A reproducing apparatus for reading information recorded on a recording medium, said reproducing apparatus comprising:

a light source;

a solid immersion mirror device made principally of a light-permeable medium having a refractive index of greater than 1,

said solid immersion mirror device including

a first reflecting surface which is part of a curved surface produced by rotating part of a parabola lying on the opposite side of a rotational axis from the vertex of said parabola about said rotational axis, said rotational axis being parallel to the symmetry axis of said parabola and intersecting said parabola at a position spaced apart from said vertex of said parabola, and

a second reflecting surface which is part of a conical surface produced by rotating part of a line lying on the opposite side of said rotational axis from said vertex, said line being perpendicular to a line segment connecting the focus of said parabola and a point of intersection of said parabola and said rotational axis within a plane including said parabola,

wherein collimated light entering said medium from the second reflecting surface side along said rotational axis is reflected sequentially from said first and second reflecting surfaces while propagating in said medium, and is then focused to a light focusing point on a boundary of said medium;

an optical system for directing light emitted from said light source to said solid

immersion mirror device;

a scanning mechanism for scanning said solid immersion mirror device along a recording surface of said recording medium, with said light focusing point of said solid immersion mirror device opposed to said recording surface; and

a detector for detecting light from said recording surface.

27. A reproducing apparatus for reading information recorded on a recording medium, said reproducing apparatus comprising:

a light source;

a solid immersion mirror device made principally of a light-permeable medium having a refractive index of greater than 1,

said solid immersion mirror device including

a first reflecting surface of a substantially annular shape and provided in a lower portion of said medium, and

a second reflecting surface provided in an upper portion of said medium,

wherein light entering said medium in a predetermined direction from said upper portion to said lower portion is reflected sequentially from said first and second reflecting surfaces while propagating in said medium, and is then focused to a light focusing point on a boundary of said medium, and

wherein part of light reflected from said first reflecting surface is reflected from near a point of intersection of said second reflecting surface and a line passing through said light focusing point and parallel to said predetermined direction;

an optical system for directing light emitted from said light source to said solid immersion mirror device;

a scanning mechanism for scanning said solid immersion mirror device along a recording surface of said recording medium, with said light focusing point of said solid immersion mirror device opposed to said recording surface; and

a detector for detecting light from said recording surface.

28. A reproducing apparatus for reading information recorded on a recording medium, said reproducing apparatus comprising:

a light source;

a solid immersion mirror device made principally of a light-permeable medium having a refractive index of greater than 1,

said solid immersion mirror device including

a first reflecting surface provided in a lower portion of said medium, and

a second reflecting surface provided in an upper portion of said medium,

wherein at least part of light entering said medium in a predetermined direction from said upper portion to said lower portion passes through said second reflecting surface, is thereafter reflected sequentially from said first and second reflecting surfaces while propagating in said medium, and is then focused to a light focusing point on a boundary of said medium;

an optical system for directing light emitted from said light source to said solid immersion mirror device;

a scanning mechanism for scanning said solid immersion mirror device along a recording surface of said recording medium, with said light focusing point of said solid immersion mirror device opposed to said recording surface; and

a detector for detecting light from said recording surface.

29. A solid immersion mirror device made principally of a light-permeable medium having a refractive index of greater than 1, said solid immersion mirror device comprising:

an upper surface formed in an upper portion of said medium; and

a side reflecting surface of a substantially tubular shape extending from said upper portion to a lower portion of said medium,

wherein light entering said medium by way of said upper surface in a direction from said upper portion to said lower portion is reflected once from said side reflecting surface while propagating in said medium, and is then focused to a light focusing point on a boundary of said lower portion.

30. The solid immersion mirror device according to claim 29,

wherein said side reflecting surface has a lower end substantially laterally surrounding said light focusing point.

31. The solid immersion mirror device according to claim 29,

wherein said side reflecting surface is part of a curved surface produced by rotating a parabola about a symmetry axis thereof; and

wherein said light is collimated light traveling along said symmetry axis, and said light focusing point is positioned at the focus of said parabola.

32. The solid immersion mirror device according to claim 31,

wherein said medium has a refractive index of not less than $1/\sin\theta$ where θ

is a minimum incident angle on said side reflecting surface.

33. The solid immersion mirror device according to claim 29, further comprising

a component for intercepting light in a central region of said upper surface.

34. The solid immersion mirror device according to claim 29, further comprising

a component for converting light in the form of a light beam of a circular sectional shape into light in the form of a light beam of a ring-shaped sectional shape.

35. The solid immersion mirror device according to claim 29,

wherein a surface of said medium is provided with a mask near said light focusing point, and said mask has a minute opening formed at said light focusing point.

36. A reproducing apparatus for reading information recorded on a recording medium, said reproducing apparatus comprising:

a light source;

a solid immersion mirror device made principally of a light-permeable medium having a refractive index of greater than 1,

said solid immersion mirror device including

an upper surface formed in an upper portion of said medium, and

a side reflecting surface of a substantially tubular shape extending from said upper portion to a lower portion of said medium,

wherein light entering said medium by way of said upper surface in a

direction from said upper portion to said lower portion is reflected once from said side reflecting surface while propagating in said medium, and is then focused to a light focusing point on a boundary of said lower portion;

an optical system for directing light emitted from said light source to said solid immersion mirror device;

a scanning mechanism for scanning said solid immersion mirror device along a recording surface of said recording medium, with said light focusing point of said solid immersion mirror device opposed to said recording surface; and

a detector for detecting light from said recording surface.

37. A solid immersion mirror device made principally of a light-permeable medium having a refractive index of greater than 1, said solid immersion mirror device comprising:

a light incident point positioned on a boundary of an upper portion of said medium; and

a side reflecting surface of a substantially tubular shape extending from said upper portion to a lower portion of said medium,

wherein divergent light entering said medium from said light incident point is reflected once from said side reflecting surface while propagating in said medium, and is then focused to a light focusing point on a boundary of said lower portion.

38. The solid immersion mirror device according to claim 37,

wherein said side reflecting surface is part of a curved surface produced by rotating an ellipse about a major axis thereof; and

wherein said light incident point and said light focusing point are positioned at

two foci of said ellipse, respectively.

39. The solid immersion mirror device according to claim 37,

wherein a surface of said medium is provided with a mask near said light focusing point, and said mask has a minute opening formed at said light focusing point.

40. The solid immersion mirror device according to claim 39,

wherein said minute opening has a diameter not greater than a wavelength of said divergent light.

41. A solid immersion mirror device made principally of a light-permeable medium having a refractive index of greater than 1, said solid immersion mirror device comprising:

a light incident point positioned on a boundary of an upper portion of said medium;

a first reflecting surface positioned in a lower portion of said medium and having a downwardly protruding convex shape; and

a second reflecting surface positioned in said upper portion,

wherein divergent light entering said medium from said light incident point is reflected sequentially from said first and second reflecting surfaces while propagating in said medium, and is then focused to a light focusing point on a boundary of said lower portion.

42. The solid immersion mirror device according to claim 41,

wherein said first reflecting surface is a lower part of a curved surface produced

by rotating an ellipse about a major axis thereof extending vertically;

wherein the length of said major axis of said ellipse is three times greater than a distance between two foci of said ellipse;

wherein said second reflecting surface is part of a plane perpendicularly intersecting said major axis at a lower one of said two foci of said ellipse; and

wherein said light incident point is positioned at said lower focus of said ellipse, and said light focusing point is positioned at a lower point of intersection of said ellipse and said major axis.

43. The solid immersion mirror device according to claim 41,

wherein a surface of said medium is provided with a mask near said light focusing point, and said mask has a minute opening formed at said light focusing point.

44. The solid immersion mirror device according to claim 43,

wherein said minute opening has a diameter not greater than a wavelength of said divergent light.

45. A solid immersion mirror device made principally of a light-permeable medium having a refractive index of greater than 1, said solid immersion mirror device comprising:

a light incident point positioned on a boundary of said medium;

a first reflecting surface; and

a second reflecting surface,

wherein divergent light entering said medium from said light incident point is reflected from said first reflecting surface to be converted into collimated light while

propagating in said medium, and said collimated light is reflected from said second reflecting surface and is then focused to a light focusing point on a boundary of said medium.

46. The solid immersion mirror device according to claim 45,

wherein said first reflecting surface and said second reflecting surface have respective effective areas of the same shape; and

wherein light reflected along a predetermined path of reflection from said first reflecting surface travels in a reverse direction along a path of reflection corresponding to said predetermined path of reflection, and is then reflected from said second reflecting surface.

47. The solid immersion mirror device according to claim 45,

wherein said first reflecting surface and said second reflecting surface have respective effective areas of different shapes.

48. The solid immersion mirror device according to claim 45,

wherein said first reflecting surface is part of a curved surface produced by rotating a first parabola about a symmetry axis thereof, and said light incident point is positioned at the focus of said first parabola;

wherein said second reflecting surface is part of a curved surface produced by rotating a second parabola about a symmetry axis thereof, said symmetry axis of said second parabola being coincident with said symmetry axis of said first parabola, and said light focusing point is positioned at the focus of said second parabola; and

wherein said collimated light is emitted from said first reflecting surface along

said symmetry axis, and is then incident on said second reflecting surface.

49. The solid immersion mirror device according to claim 45,

wherein said first reflecting surface has a first reflecting surface element, and an annular second reflecting surface element opposed to said first reflecting surface element;

wherein said second reflecting surface has a third reflecting surface element, and an annular fourth reflecting surface element opposed to said third reflecting surface element;

wherein said light incident point is positioned substantially centrally of said second reflecting surface element, and said light focusing point is positioned substantially centrally of said fourth reflecting surface element; and

wherein divergent light entering said medium from said light incident point is reflected sequentially from said first and second reflecting surface elements to be converted into collimated light, and thereafter said collimated light is reflected sequentially from said fourth and third reflecting surface elements and is then focused to said light focusing point.

50. The solid immersion mirror device according to claim 49,

wherein each of said first reflecting surface element and said third reflecting surface element is a flat surface; and

wherein each of said second reflecting surface element and said fourth reflecting surface element is part of a curved surface produced by rotating a parabola about a symmetry axis thereof.

51. The solid immersion mirror device according to claim 50,

wherein said first reflecting surface element and said third reflecting surface element are opposite surfaces of a single plate-like reflecting component.

52. The solid immersion mirror device according to claim 47,

wherein said first reflecting surface has a first reflecting surface element, and an annular second reflecting surface element opposed to said first reflecting surface element, and said light incident point is positioned substantially centrally of said second reflecting surface element;

wherein said second reflecting surface is part of a curved surface produced by rotating a parabola about a symmetry axis thereof, and said light focusing point is positioned at the focus of said parabola; and

wherein divergent light entering said medium from said light incident point is reflected sequentially from said first and second reflecting surface elements to be converted into collimated light, and thereafter said collimated light is incident on said second reflecting surface along said symmetry axis.

53. The solid immersion mirror device according to claim 45, further comprising

an intermediate reflecting surface between said first reflecting surface and said second reflecting surface.

54. The solid immersion mirror device according to claim 45,

wherein a surface of said medium is provided with a mask near said light focusing point, and said mask has a minute opening formed at said light focusing point.

55. The solid immersion mirror device according to claim 54,

wherein said minute opening has a diameter not greater than a wavelength of said divergent light.

56. A reproducing apparatus for reading information recorded on a recording medium, said reproducing apparatus comprising:

a light source;

a solid immersion mirror device made principally of a light-permeable medium having a refractive index of greater than 1,

said solid immersion mirror device including

a light incident point positioned on a boundary of an upper portion of said medium, and

a side reflecting surface of a substantially tubular shape extending from said upper portion to a lower portion of said medium,

wherein divergent light entering said medium from said light incident point is reflected once from said side reflecting surface while propagating in said medium, and is then focused to a light focusing point on a boundary of said lower portion;

an optical system for directing light emitted from said light source to said light incident point of said solid immersion mirror device;

a scanning mechanism for scanning said solid immersion mirror device along a recording surface of said recording medium, with said light focusing point of said solid immersion mirror device opposed to said recording surface; and

a detector for detecting light from said recording surface.

57. A reproducing apparatus for reading information recorded on a recording

medium, said reproducing apparatus comprising:

a light source;

a solid immersion mirror device made principally of a light-permeable medium having a refractive index of greater than 1,

said solid immersion mirror device including

a light incident point positioned on a boundary of an upper portion of said medium,

a first reflecting surface positioned in a lower portion of said medium and having a downwardly protruding convex shape, and

a second reflecting surface positioned in said upper portion,

wherein divergent light entering said medium from said light incident point is reflected sequentially from said first and second reflecting surfaces while propagating in said medium, and is then focused to a light focusing point on a boundary of said lower portion;

an optical system for directing light emitted from said light source to said light incident point of said solid immersion mirror device;

a scanning mechanism for scanning said solid immersion mirror device along a recording surface of said recording medium, with said light focusing point of said solid immersion mirror device opposed to said recording surface; and

a detector for detecting light from said recording surface.

58. A reproducing apparatus for reading information recorded on a recording medium, said reproducing apparatus comprising:

a light source;

a solid immersion mirror device made principally of a light-permeable medium

having a refractive index of greater than 1,

said solid immersion mirror device including

a light incident point positioned on a boundary of said medium,

a first reflecting surface, and

a second reflecting surface,

wherein divergent light entering said medium from said light incident point is reflected from said first reflecting surface to be converted into collimated light while propagating in said medium, and said collimated light is reflected from said second reflecting surface and is then focused to a light focusing point on a boundary of said medium;

an optical system for directing light emitted from said light source to said light incident point of said solid immersion mirror device;

a scanning mechanism for scanning said solid immersion mirror device along a recording surface of said recording medium, with said light focusing point of said solid immersion mirror device opposed to said recording surface; and

a detector for detecting light from said recording surface.